

phase of activity only. In the second method the general gaseous exchanges of the body were watched during states of rest and activity of the organ to be investigated. This, however, was inapplicable to the glands of the body on account of their small size. The third method was that of measuring the blood gases, combined with an estimation of the rate of flow of blood through the gland.

Three glands have been studied by this method up to the present, the submaxillary, the pancreas, and the kidney. In the submaxillary gland the problem was very complicated, since the blood became concentrated, losing a tenth of its water or even more, and a considerable quantity of the carbonic acid left the gland in the secretion. After due allowance had been made for these disturbing factors, it appeared that the O intake and the CO₂ output were increased from three- to four-fold during stimulation of the chorda tympani nerve. As to how far these changes might be due to concomitant vascular changes was studied by examining the gaseous exchanges of an atropinised gland during stimulation of the chorda. It was found that this led to no increase in the amounts of O withdrawn, though an increased output of CO₂ was observed.

In the pancreas, which had been studied in conjunction with Prof. Starling, there was often no increased flow of blood synchronously with a secretion following an injection of secretin. They invariably found an increased absorption of O. Usually this increase was considerable; thus from eight comparisons the mean quantity of O taken up by the resting gland was 1.5 c.c. per minute, and by the active gland 5.5 c.c. per minute. These results were entirely in harmony with those brought forward by Prof. Brodie for the kidney.

It seemed, then, that glandular activity was accompanied by a large and instantaneous consumption of O, but that it was not necessarily accompanied by an increased CO₂ output.

Another point indicated was the magnitude of the gaseous metabolism of glands. In the submaxillary and in the pancreas, when at rest, about 0.025 c.c. to 0.035 c.c. of O per minute per gram of gland substance was absorbed. In the kidney Prof. Brodie had given one instance in which the organ was using as much as one-fifth of the total quantity of O taken in by the lungs, and it was common to find the O consumption of the kidney during diuresis to amount to one-tenth of the total taken by the whole body.

Prof. T. Clifford Allbutt suggested that the theories advanced as to the part played by oxygen offered some explanation of the fact, often experienced clinically, that the administration of oxygen gave relief to patients not only in cases where the heart and lungs were affected, but in many others also. He had long since given up the idea that oxygen was effective in these cases simply on account of the more favourable conditions under which the respiratory functions were placed. This was evidenced, for instance, by the tenacity with which the patients adhered to the treatment; for example, in cases of the vomiting of pregnancy, where its administration was often of great service.

Sir John Burdon-Sanderson, in bringing the discussion to a close, remarked that it had been an exceedingly fruitful one, and none the less so because the points under discussion had not been settled, but were still under investigation. It seemed clear to him that oxygen played two parts in metabolic processes, one of which was prominent in muscle, and was responsible for the final oxidation of explosive material, while the other, which was more accentuated in glands, was akin to a building up process, as it was involved in the elaboration of new material.

GEOLOGICAL NOTES.

THIE puzzling and commonly fragmental remains styled by von Gümbel Lithiotis are the subject of an elaborate monograph by Dr. Otto Reis (*Abhandlungen der k.k. geol. Reichsanstalt*, Bd. xvii., Heft 6, 1903). After being considered as plants, from algae to palms, for some twenty years, they settled down in 1890 as bivalve molluscs allied to oysters. Von Gümbel's revision, to this effect, is now revised by Dr. Reis, who points out that certain long ridges in the hinge-area represent teeth. Two genera, Cochlearites

and Lithiotis, are established, forming the Lithiotidæ, a subfamily of the Spondylidæ. The minute structure of the shells is carefully described.

The interest aroused by the publication of "Bau und Bild Österreichs," recently reviewed in these columns, has called from Dr. Friedrich Katzer a series of papers (*Verhandlungen der k.k. geol. Reichsanstalt*, 1904, pp. 123, 150, 177, and 193), in which he hopes to fill some of the gaps still remaining in our knowledge of Bohemian geology. His work covers such widely diverse subjects as the zoning of the north-eastern coalfield under the Riesengebirge, and the magnetite-ores, occurring as separation-products in garnet-amphibolite, in the neighbourhood of Kutna Hora.

In the *Verhandlungen der k.k. geol. Reichsanstalt* for 1904 Herr R. Zuber (p. 200) explains his views as to the analogy of the Flysch deposits of Europe and those forming in tropical climates, with a heavy rainfall, in the neighbourhood of the mouths of rivers, whether these flow from continental land or from the members of an archipelago. Dr. H. Vettler (p. 134) interestingly connects the structure of the Little Karpathians with that of the eastern Alps on the one hand, and of the true Karpathians on the other. The Flysch of the north side of the Alps thus reappears from under the Vienna basin, and passes into the Karpathian Sandstone series; while the characteristic Karpathian "Klippen" are also traceable in this connecting range. The author regards the so-called Silurian grauwacke of Hainburg, down against the Danube, and similar rocks of the Leitha range, as in reality the equivalents of the Liassic beds in the Little Karpathians.

The *Jahrbuch der k.k. geol. Reichsanstalt* of Vienna usually contains more massive papers than the *Verhandlungen*, though it is difficult to discriminate between the two in scientific value. In vol. liii. of the former (1903), pp. 169-252, Dr. O. Ampferer describes, with numerous sections, the Triassic and Jurassic mountains that form the impressive broken country of crag and forest between Innsbruck and the Achensee. He illustrates his view of their structure (plate x.) by a skilful drawing of a relief-model, much in the American manner, thus emphasising the simpler anticlinal and synclinal structure in the south, and the great overfold of Trias upon a recumbent Jurassic synclinal in the Gamsjoch area. It seems possible, as the author points out, that the whole highland of Triassic rocks rests upon an underfolded and underthrust knot of younger strata. Dr. Ampferer modestly regards his own researches as supplementing, and correcting at certain points, those of Prof. Rothpletz and his Bavarian colleagues. He adds, moreover, details as to the glacial phenomena throughout the district. Herr E. Fugger's paper in the same volume (p. 295) describes the foothills of the Alps in the famous Salzkammergut area, where the Flysch, with its dubious fossils, forms the oldest series, and is confidently ascribed to the Upper Cretaceous epoch. Dr. F. Ryba (p. 351) revises and amplifies the list of fossil plants from the Cannel Coal of Nýřan in Bohemia, and Dr. Waagen (p. 443) adds to our knowledge of the small brachiopods characteristic of the Tyrolean Trias.

We have received the August number of the *Quarterly Journal of the Geological Society*, which contains a well illustrated article on the history of volcanic action in the Phlegræan Fields by Prof. Giuseppe de Lorenzo; an account of the discovery of a human skeleton in Gough's Cavern, at Cheddar, by Mr. H. N. Davies, who regards the remains as of late Palæolithic age, although in the discussion which followed the reading of the paper this antiquity was questioned; and among other papers there is an important one on the age of the Llyn-Padarn dykes in Carnarvonshire by Mr. J. Vincent Elsden, who regards these deep-seated intrusions as having taken place during the latest stage of the Bala eruptions.

The summary report of the Geological Survey Department of Canada for 1903 has been issued by Dr. Robert Bell, the acting deputy head and director. As usual, the energies of the staff have been given mainly to investigating and aiding the development of the mineral resources of the country. Field work has been carried on in Yukon territory, in British Columbia, in the Keewatin district, in Ontario, Quebec, New Brunswick, and Nova Scotia. In connection with the large output of coal which is now going on in

both Nova Scotia and Vancouver Island, it is mentioned that the only coal known to occur in North America on the immediate seaboard of either the Atlantic or Pacific belongs to Canada.

Some new genera of Carboniferous Mollusca from the United States have been described by Mr. G. H. Girty (*Proc. U.S. National Mus.*, vol. xxvii., No. 1372). They include Limipecten, a form considered to be near to Aviculipecten (*sic*), and with that genus to have affinities with the Pectinidae rather than with Aviculidae. Other new genera are Pleurophorella, allied to Allerisma, and Clavulites, having some resemblances to Dentalium.

The Miocene diabase of the Santa Cruz Mountains in San Mateo County, California, is described in some detail by Messrs. H. L. Haehl and R. Arnold (*Proc. Amer. Phil. Soc.*, vol. xlili., No. 175). The diabase, in the form of tuffs, dykes, and intrusive sheets, occupies about 35 square miles in an area of 300 square miles. It is remarked that the tuffs are interbedded with Miocene limestones, sandstones, and shales, and that intrusions of limestone derived from the interbedded limy layers have been forced into fissures in the tuff. In the intrusive diabase the percentages of soda and titanium are large, and it presents the characters of augite-teschenite.

An essay on the palaeontology of the Lancashire Coal-measures, part i., contributed by Mr. H. Bolton to the *Transactions* of the Manchester Geological and Mining Society (vol. xxviii., part xiv.), has been reprinted as one of the "Museum Handbooks" of the Manchester Museum, Owens College (price 1s.). In this work the author deals with the lower Coal-measures, and his object has been to record the horizon and geographical occurrence of each species so far as possible by reference to known specimens.

Prof. G. A. J. Cole and Mr. T. Crook have reported on rock specimens dredged from the floor of the Atlantic off the west coast of Ireland in 1901 (Dept. of Agric. and Techn. Instruction for Ireland, App. to part ii. of Rep. on Sea and Inland Fisheries). The rocks which were obtained off the west coast of Mayo and Galway appear to have been derived from submerged masses of rocks familiar in western Ireland. They include also an olivine-gabbro which is regarded as probably of Carboniferous age.

In an article published in the *Land Agents' Record* (August 20) Mr. F. J. Bennett directs attention to the important uses to which the Ordnance Survey maps, on the scale of 25 inches to a mile, might be put for estate and agricultural purposes. As he points out, much valuable information is lost, both to the landowner and farmer, to say nothing of the geologist, for want of recording it at the time. He instances the nature of the soil and subsoil as proved in draining the land and in various temporary excavations, as well as information with regard to wells, springs, stone quarries, or clay pits. The courses of the drains have rarely been laid down on estate maps. In addition to records of these matters, he suggests that the maps be used also for statistics with reference to cultivation. Thus the amount of seed sown, the kind and quantity of manure used, the weather, and, finally, the result of each field crop might be notified. If these particulars were tabulated, say for seven years, the reasons for success or failure might be judged. In the transfer of property or of leases such information would be of the utmost value to the incoming owner or tenant, and the records, which would be the private property of the occupier, should be of sale value.

We have received a number of important geological publications from South Africa. In the *Transactions* of the South African Philosophical Society (vol. xv., part ii.) Mr. E. H. L. Schwarz describes the high-level gravels which cap the flat-topped hills all over the southern coast regions of Cape Colony. The evidence shows that the gravels were river-born, and in the Karroo district they yield gold. No gold-bearing reef has, however, been detected in that area, and the author is strongly of opinion that the gold came from the Zwartbergen, where it occurs in the Table Mountain Sandstone. Messrs. A. W. Rogers and A. L. du Toit describe the Sutherland volcanic pipes and their relationship to other vents, notably those of Kimberley. In the *Transactions* of the Geological Society of South Africa (vol. vii., part i.) there are various papers of local interest on the geology of the Transvaal, and on the Witwatersrand series in particular. In the annual report of the Geological

Commission of the Cape of Good Hope for 1903 we have a record of the careful detailed work carried on by the director, Mr. A. W. Rogers, and his staff. The survey of the southwestern portion of the Karroo has been completed, and much information has been gathered with reference to the sedimentary and volcanic formations. The recognition, in the Verloren Valley, of a group of rocks (the Ibiquas series) between the Table Mountain Sandstone and the Malmesbury series is of considerable interest.

"The Geology of the Country around Merthyr Tydfil" (being the fifth part of the "Geology of the South Wales Coal-field") has just been issued by the Geological Survey, price 1s. 6d. It is the work of Messrs. A. Strahan, Walcot Gibson, and T. C. Cantrill, and is an explanation of the geological map sheet 231. The area includes the North Crop of the Coal-field from Dowlais to the Tawe Valley, with a considerable tract of Old Red Sandstone in the mountainous land of Fforest Fawr, and also of Lower Carboniferous rocks. The great scarp of the Pennant Sandstone stretches across the country on the south. The stratigraphical features, the lithology, the faults and disturbances of this important coal-region are dealt with very fully; the Glacial drifts and other superficial deposits are duly described, and a short chapter is given on the economic products.

We have received an official report by Signor A. F. Umlauf on the Cinnabar of Huancavelica, issued as a *Boletin* of the Corps of Mining Engineers of Peru. The ore occurs in irregular deposits in sandstones and limestones, which have yielded Cretaceous fossils, and sections are added showing its mode of occurrence. A description is also given of the aludel furnaces, which are used in extracting the mercury, and have remained practically unchanged for more than two centuries.

From the United States Geological Survey we have received *Bulletin* No. 228, dealing with analyses of rocks from the laboratory, 1880 to 1903, by Mr. F. W. Clarke; also *Professional Paper* No. 28, giving the superior analyses of igneous rocks from Roth's Tabellen, 1869 to 1884, arranged according to the quantitative system of classification.

The occurrence of a "calcareous coal" in the Lanarkshire Coal-field is described by Mr. R. W. Dron (*Trans. Inst. Mining Engineers*, vol. xvii.), and shown by analysis to contain carbonates of lime and magnesia. The author seems to have been unaware that Mr. A. Strahan, in 1901, brought before the Geological Society an account of the passage of a seam of coal into dolomite, as observed at the Wirral Colliery in the small Parkgate Coal-field.

The glaciation of Mount Ktaadn, in northern Maine, forms the subject of an essay by Mr. R. S. Tarr (*Bull. Geol. Soc. Amer.*, vol. xi.). The mountain, which is composed of granite, rises to a height of 5150 feet, and has hitherto been regarded as bearing no proof of ice-covering during the Glacial period. The author brings forward evidence to show that the ice did overtop the mountain, and that glaciers subsequently occupied the valleys on its eastern side, leaving well defined moraines some of which enclose lakes.

In the *Brazilian Mining Review* (for April and May) Mr. H. Kilburn Scott gives some account of the mineral resources of Rio Grande do Sul, which is the southernmost of the States of Brazil. The village of Lavras is at present the centre of the gold-mining industry, the gold occurring in quartz-veins or as impregnations in decomposed syenite-rock. The principal copper deposit is that of Camauam, and the ores comprise copper glance, copper pyrites, and bornite (erubescens). Lodes occur in hard conglomerates and sandstones which have been invaded by melaphyre, and there seems to be a close connection between these metaliferous deposits and the eruptive rock.

A useful index to the mineral resources of Alabama, compiled by Messrs. E. A. Smith (State geologist) and H. McCalley, has been issued by the Geological Survey of Alabama. It includes an account of iron and manganese ores, bauxite, coal, clays, building stones, mineral paints, mineral waters, &c., and is illustrated by a small geological map and pictorial views.

The tin deposits of the York Region, Alaska, are briefly described by Mr. A. J. Collier (*Bulletin* No. 229, U.S. Geol. Survey). Stream tin was discovered in 1900, and since then

prospecting has been going on to determine its extent and to locate its source in the bed-rock. The ore is mostly cassiterite, but stannite also occurs. Pebbles of slate containing small tin-bearing quartz veins have been found in the gravels, while elsewhere the ore has been found disseminated through more or less altered granitic dykes.

PRIZE SUBJECTS OF THE INDUSTRIAL SOCIETY OF MULHOUSE.

THE Industrial Society of Mulhouse has issued a programme of the prizes to be awarded by the society in 1905; excluding the subjects which are of a purely local or technical character, the following are the principal prizes open to competition to all nationalities:—

In the section of chemistry, medals of honour will be given for experimental investigations of the alizarine reds, of the colouring matter of raw cotton, of the transformation of cotton into oxycellulose, and of cochineal carmine; for the synthesis of the colouring matter of cochineal or of some other dye used in industry; and for the production of fast dyes of a specified nature. Several medals will also be awarded for studies of special mordants and for the synthesis of some naturally occurring substance. A sum of 500 francs to 1000 francs is to be allotted to the best compilation of densities of mineral and organic substances in the solid state and in cold saturated solution. Many practical chemical problems in the bleaching and dyeing of cotton, wool, and silk are also suggested as subjects for competition.

In the section of mechanical arts, a prize of 500 francs and a silver medal is offered for a new method of construction of buildings suitable for cotton spinning, wool combing, or calico printing. The following subjects will receive medals:—a new non-tubular type of boiler; an indicator of the total work done in a steam engine; a new system for heating steam boilers; various machines for combing, carding, and weaving the textile fibres; a comparative study of electric and gas lighting in factories; a system of automatic lighting by conductors of the second class.

The following subjects deal with natural history and agriculture:—a catalogue of the plants in the neighbourhood of Mulhouse, Thann, Altkirch, and Guebwiller; an account of the fauna of Alsace; a mineralogical or geological description of part of Alsace; a study of the plants or insects inimical to agriculture in the same province. A medal is also offered for an investigation of the character of Alsace in prehistoric times.

In the sections of commerce and statistics the subjects are:—a consideration of the questions of insurance against risks of transport and fire; the influence of taxation on industry; and the effect of trusts and like organisations on commerce.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. J. J. Lister, F.R.S., of St. John's College, has been appointed demonstrator of comparative anatomy.

The Board of Geographical Studies has arranged for a course of instruction in geographical surveying, to be given by Mr. Hinks at the observatory.

The council of the Senate proposes an important scheme whereby the matriculation and senior local examinations of the Universities of London, Oxford, and Cambridge shall be mutually recognised. The object is to diminish the number of distinct examinations for which schoolmasters have to prepare their pupils. The proposed conditions are set forth in the *University Reporter* for October 11.

Mr. R. R. Webb, St. John's, Mr. G. H. A. Wilson, Clare, Mr. J. M. Dodds, Peterhouse, and Mr. E. W. Barnes, Trinity, will be the examiners for the mathematical tripos, part i., in 1905.

SIR ISAMBARD OWEN has been appointed principal of the Durham College of Science in place of the late Dr. Gurney.

DR. ARTURRO MARCACCI, of the University of Palermo, has been appointed professor of physiology in the University of Pavia.

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DR. HERMANN KOSSEL, of the Imperial Board of Health at Berlin, has been appointed to the chair of hygiene at the University of Giessen in succession to Dr. Georg Gaffky.

THE first congregation to inaugurate the University of Leeds was held on October 6, and the honorary degrees announced in our issue of September 29 (p. 547) were conferred. The Chancellor of the university, Lord Ripon, presided.

WE learn from the *Athenaeum* that Dr. Hans Batterman, of the Berlin Observatory, has been appointed director of the observatory at Königsberg, and professor of astronomy at the University of Königsberg, in succession to Prof. Hermann Struve, lately appointed to the vacancy at Berlin caused by the retirement of Prof. Förster.

THE Board of Education has issued its "Syllabuses and Lists of Apparatus" applicable to schools and classes other than elementary from August 1, 1904, to July 31, 1905. A new subject, under the title "Elementary Science of Common Life (Chemistry)," number twenty-six, has been added to the list of branches of science in which the board holds examinations. The list of subjects in which no examinations are held, though the subjects are recognised by the Board, has been extended, and now includes many subjects introductory to more advanced work in technology.

THE anonymous gift of 1000l. to the University College of Bristol announced a few days ago is, it may be hoped, an indication that the work of this institution is being appreciated in Bristol and the surrounding district. In addition to the usual courses, appropriate and systematic instruction is given at the college in those branches of applied science which are most nearly connected with the arts and manufactures. We notice that the total number of individuals, excluding medical students, attending the college during the session 1903-4 was 1084, of whom 596 were day students.

THE new calendar of University College, London, that for the session 1904-5, gives full particulars of several interesting new developments in the work of the college. The university courses of study, especially those in economics, have been extended, and further arrangements have been made for post-graduate courses, lectures, and research—this post-graduate work is explained fully in ten pages of the calendar. The list of papers and other publications from the scientific departments of the college, since the Dean's report of last year, runs to eight full pages, and shows that the work now being accomplished in the college is of the same high order as in previous years.

IT is reported that there is apparently a deficiency of about 2000l. for the annual working expenses of the Tata Research Institute, and on account of this the scheme for the institute is at a standstill. Referring to this, *Capilla*... remarks:—"The question now is whether for the sake of two or three thousand pounds India should go without a Research Institute. Is the object good or not? If it was not good, why did the Government of India promise to help it? If it is good, why should there be any stinginess on their part about it? Should a great Government refuse its support and countenance to a scheme, the expenditure on which will be repaid not only to the people of India, but also to the Government itself a hundredfold?"

THE buildings of the new technical college at Danzig were opened on October 6 in the presence of the German Emperor. The college, which has been established on a modern basis, is intended to develop the industries of West Prussia and of the city of Danzig. Shipbuilding is to receive special attention. In a speech which he made, the Emperor referred to the importance of technical education for the maintenance of Germany's position among the nations, and described the special characteristic of the German technical colleges as being their "comprehensive many-sidedness." It is, he continued, for this reason that these colleges constitute a scientific "Universitas" which may be compared justly with the old universities, and explains why the endeavour has been made to place the two kinds of institutions on an equal footing by bestowing upon the technical colleges the right to confer degrees. "May the new college," the Emperor concluded, "prosper and flourish to the glory of German learning, to the blessing of these old Prussian provinces, and to the honour of the German name!"